

Possible reasons for mass migrations of dragonflies in spring include dispersal from drought-affected areas, sustained southerly winds, and population increases. These movements may not be annual events and probably vary greatly in magnitude (Soltesz et al., 1995).

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RECORDS FOR WINTER SCORPIONFLIES IN VIRGINIA (MECOPTERA: BOREIDAE).--Although the great majority of mecopterans are active as adults during the warmer months of the year, there is a small and hardy contingent, species of the family Boreidae, which has become adapted to life during the cold winter periods and may even be found walking actively on snow. This seasonal preference has resulted in a group of insects somewhat less well known than their thermophilus relatives, and even the details of their geographic distribution remain to be worked out. Knowledge of this family was summarized several decades ago (Penny, 1977) in a useful and complete monograph, which serves as a baseline upon which local studies can be superimposed. Penny recognized ten Nearctic species of the major genus *Boreus*, of

which only two occur in the eastern states, and provided distributional maps which reflected the paucity of museum material available to him at the time. Although it is understandable that traditional hand-capture methods have not been extensively employed, the scarcity of Virginia records is surprising, considering that pitfall trap lines have been operated throughout the year at localities across the state including White Top Mountain. The following is a summary of known Virginia records based on literature and material in the Virginia Museum of Natural History (VMNH, identifications by G. W. Byers) and the National Museum of Natural History (USNM, identifications by O. S. Flint).

*Boreus brumalis* (Fitch). The main body of this species' range extends from Ontario and Maine west through Michigan and Ohio and south to the Great Smoky Mountains, Tennessee, with disjunct outlying segments in Minnesota, Wisconsin, and Illinois. There appear to be no published localities for the relatively well-collected states of Arkansas (Robison et al., 1997) and Kentucky (Byers & Covell, 1981). Byers (1962) published a record for Quantico, Prince William County, Virginia. Penny (1977) plotted only two Virginia records, including the foregoing and another in Giles County, presumably at or near Mountain Lake.

New Virginia records are: *Arlington Co.*: Arlington, 11 December 1960, A. B. Gurney (USNM 2). *Augusta Co.*: George Washington National Forest (GWNF), timber management compartment 460-5, ca. 5 mi W Stokesville, 18 May 1988, Barry D. Flamm (VMNH 1), same site and collector, 22 December 1988 (VMNH 1). Shenandoah Mountain, 5 mi S Reddish Knob on FS Rt. 85, 17 June 1988, Kurt A. Buhlmann (VMNH 1); same site and collector, 19 November 1988 (VMNH 1). *Fairfax Co.*: Dead Run, on snow, 20 January 1957, A. B. Gurney (USNM 2); Falls Church, on snow, 18 December 1957, A. B. Gurney (USNM 1); River Bend Park, Great Falls, 2 January 1955, G. B. Vogt (USNM 1). *Loudoun Co.*: Appalachian Trail near Round Hill, 8 February 1970, O. S. Flint, Jr. (USNM 16). *Page Co.*: Mountain Run, base of Strickler Knob, ca. 5 mi W Luray, 9 February 1975, O. S. Flint, Jr. (USNM 6). *York Co.*: Yorktown Naval Weapons Station, 4 April 1991, Kurt A. Buhlmann (VMNH 1).

Most of these records are consistent with the known range of this boreal, psychrophilic insect. That for York County is a little more southward and lowland than might have been expected, but Prof. Byers advises (*in litt.*) that he found the species in some numbers on snow in Rock Creek Park, District of Columbia. Presumably, *B. brumalis* occurs in much of Virginia, but pitfall trapping is probably not the optimal technique for collecting this species.

*Boreus nivoriundus* (Fitch). With a range centered on northeastern North America, this species has been documented as far south as the Great Smoky Mountains, but not recorded for Kentucky (Byers & Covell, 1981) or Virginia. VMNH material is from *Augusta Co.*: ca. 5 mi W Stokesville, GWNF, compartment 453-11, 12 December 1988, Barry D. Flamm (VMNH 2); same site but compartment 453-1A, 12 December 1988, Barry D. Flamm (VMNH 2). *Nelson Co.*: "The Priest", 3900 ft., GWNF, ca. 4.5 mi SE Montebello, 20 January-28 February 1992, VMNH survey (VMNH 1).

It is not clear why the Augusta County site should be favored by boreids. The substrate is upper Devonian red shale, with a forest cover of oak, hickory, and pine. Compartments 453-11 and 453-1A (*B. nivoriundus*) are both "old growth" stands which were not logged in the last century like the remainder of the area. Compartment 460-5 (*B. brumalis*), adjacent to 453-11, is currently invested in mature second growth forest, but generalizations cannot be drawn from so few data.

The Virginia localities for *B. nivoriundus* require modification of the maps in Webb et al. (1975) and Penny (1977) to fill most of the central Appalachian lacuna they indicate.

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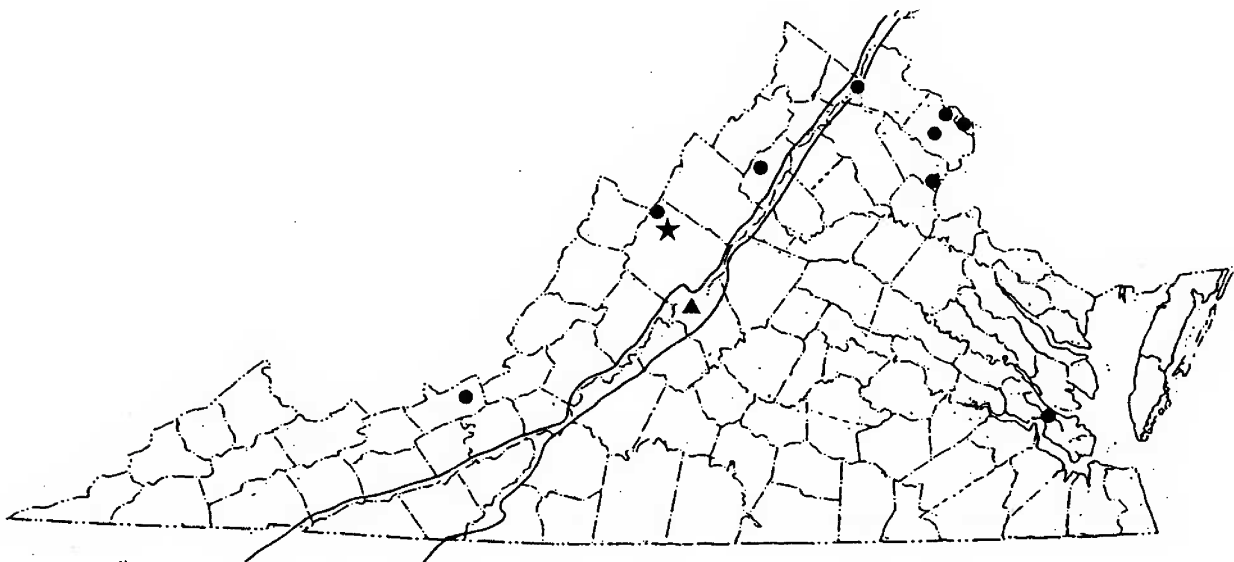


Fig. 1. Virginia localities for *Boreus brumalis* (●), *B. nivoriundus* (▲) and the site at which they are sympatric (★). The extent of the Blue Ridge Physiographic Province is indicated by the two solid lines trending northeast to southwest.